

AMENDMENTS

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1-24. (Cancelled).

25. (Previously presented) A heat spreader ball grid array package, comprising:

a ball grid substrate;

a semiconductor chip affixed to the ball grid substrate;

a mounting compound encasing the semiconductor chip over the ball grid substrate;

a heat spreader mounted over the ball grid substrate and spaced apart from the molding compound to form a gap; and

thermal grease within the gap at least between the heat spreader and the molding compound, wherein the thermal grease comprises silicon rubber containing heat-conducting particles, the heat spreader has a shape of an inverted square pie tin having an elongated surrounding lip mounted over the ball grid substrate and the heat spreader has a surface exposed to a surrounding ambient, not contacting the mounding compound and the thermal grease.

26. (Original) The structure of claim 25, wherein the semiconductor chip is a silicon chip, a germanium semiconductor chip or a silicon germanium semiconductor chip.

27. (Currently Amended) The structure of claim 25, wherein the molding compound is comprised of selected from the group consisting of epoxy resin and a curing agent; and the heat spreader is comprised of selected from the group consisting of copper, aluminum, chromium plated on copper, chromium plated on aluminum, nickel plated on copper or and nickel plated on aluminum.

28. (Original) The structure of claim 25, wherein the molding compound is comprised of epoxy resin; and the heat spreader is comprised of copper.

29. (Previously presented) The structure of claim 25, wherein the silicon rubber containing heat-conducting particles are selected from the group consisting of zinc oxide, aluminum oxide, aluminum nitride, boron nitride or ceramic fillers which have the properties of heat conduction.

30. (Cancelled).

31. (Currently Amended) The structure of claim 25, wherein the molding compound is comprised of selected from the group consisting of epoxy resin, curing agent, a catalyst and a coupling agent.

32. (Previously presented) The structure of claim 25, wherein the molding compound has coefficient of thermal expansion of from about $5 \times 10^{-6}/K$ to $15 \times 10^{-6}/K$; and the heat spreader has a coefficient of thermal expansion of from about $10 \times 10^{-6}/K$ to $25 \times 10^{-6}/K$.

33. (Previously presented) The structure of claim 25, wherein the molding compound has coefficient of thermal expansion of about $7*10^{-6}/K$; and the heat spreader has a coefficient of thermal expansion of $17*10^{-6}/K$.

34. (Previously presented) The structure of claim 25, wherein the semiconductor chip is a silicon chip and has a coefficient of thermal expansion of from about $2.5*10^{-6}/K$ to $3.5*10^{-6}/K$.

35. (Cancelled).

36. (Previously presented) The structure of claim 25, wherein the heat spreader being mounted onto the ball grid substrate at the elongated surrounding lip using epoxy adhesive.

37. (Previously presented) The structure of claim 25, wherein the thermal grease nearly fills the gap.

38-40. (Cancelled).

41. (Previously presented) A heat spreader ball grid array package, comprising:
a ball grid substrate;
a semiconductor chip affixed to the ball grid substrate;
a molding compound encasing the semiconductor chip over the ball grid substrate;

thermal grease over the molding compound, wherein the thermal grease comprises silicon rubber containing heat-conducting particles;

a heat spreader mounted over the ball grid substrate, the molding compound and the thermal grease; and

a PCB substrate or a stiffener mounted to the heat spreader, wherein the heat spreader has a shape of an inverted square pie tin having an elongated surrounding lip mounted over the ball grid substrate, and the heat spreader has a sidewall surface exposed to a surrounding ambient, not contacting the mounding compound and the thermal grease.

42. (Original) The structure of claim 41, wherein the semiconductor chip is a silicon chip, a germanium semiconductor chip or a silicon germanium semiconductor chip.

43. (Currently Amended) The structure of claim 41, wherein the molding compound is ~~comprised of selected from the group consisting of~~ epoxy resin and a curing agent; and the heat spreader is ~~comprised of selected from the group consisting of~~ copper, aluminum, chromium plated on copper, chromium plated on aluminum, nickel plated on copper ~~or~~ and nickel plated on aluminum.

44. (Original) The structure of claim 41, wherein the molding compound is comprised of epoxy resin; and the heat spreader is comprised of copper.

45. (Previously presented) The structure of claim 41, wherein the silicon rubber containing heat-conducting particles are selected from the group consisting of zinc oxide,

aluminum oxide, aluminum nitride, boron nitride or ceramic fillers which have the properties of heat conduction.

46. (Cancelled).

47. (Currently Amended) The structure of claim 41, wherein the molding compound is ~~comprised of selected from the group consisting of~~ epoxy resin, curing agent, a catalyst and a coupling agent.

48. (Previously presented) The structure of claim 41, wherein the molding compound has coefficient of thermal expansion of from about $5 \times 10^{-6}/K$ to $15 \times 10^{-6}/K$; and the heat spreader has a coefficient of thermal expansion of from about $10 \times 10^{-6}/K$ to $25 \times 10^{-6}/K$.

49. (Previously presented) The structure of claim 41, wherein the molding compound has coefficient of thermal expansion of about $7 \times 10^{-6}/K$; and the heat spreader has a coefficient of thermal expansion of $17 \times 10^{-6}/K$.

50. (Previously presented) The structure of claim 41, wherein the semiconductor chip is a silicon chip and has a coefficient of thermal expansion of from about $2.5 \times 10^{-6}/K$ to $3.5 \times 10^{-6}/K$.

51. (Cancelled).

52. (Previously presented) The structure of claim 41, wherein the heat spreader being amounted onto the ball grid substrate at the elongated surrounding lip using epoxy adhesive.

53. (Previously presented) The structure of claim 41, wherein the thermal grease nearly fills the gap.

54-56. (Cancelled).

57. (Withdrawn) The structure of claim 25, further including a pillar formed onto the ball grid substrate outboard of the semiconductor chip and the molding compound; wherein the heat spreader is mounted to the pillar.

58. (Withdrawn) The structure of claim 25, further including a pillar formed onto the ball grid substrate outboard of the semiconductor chip and the molding compound; the pillar including a stiffer portion; wherein the heat spreader is mounted to the pillar.

59. (Withdrawn) The structure of claim 25, further including a pillar formed onto the ball grid substrate outboard of the semiconductor chip and the molding compound; the pillar including a copper stiffener portion; wherein the heat spreader is mounted to the pillar.

60. (Withdrawn) The structure of claim 41, further including a pillar formed onto the ball grid substrate outboard of the semiconductor chip and the molding compound; wherein the heat spreader is mounted to the pillar.

61. (Withdrawn) The structure of claim 41, further including a pillar formed onto the ball grid substrate outboard of the semiconductor chip and the molding compound; the pillar including a stiffener portion; wherein the heat spreader is mounted to the pillar.

62. (Withdrawn) The structure of claim 41, further including a pillar formed onto the ball grid substrate outboard of the semiconductor chip and the molding compound; the pillar including a copper stiffener portion; wherein the heat spreader is mounted to the pillar.

63. (Previously presented) The structure of claim 25, wherein the heat spreader comprises a tilted sidewall connected with the elongated surrounding lip.

64. (Previously presented) The structure of claim 41, wherein the sidewall surface is a tilted sidewall surface connected with the elongated surrounding lip.